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ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION

## Specific Gravity of Arizona Gambel Oak

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Gambel Oak (*Quercus gambelii* Nutt.) is widely distributed across the mountains and plateaus of Arizona, at elevations from 5,000 to 8,000 feet.<sup>2</sup> It is also found in other western States from Texas to Wyoming. Although it characteristically occurs as a small to medium-size tree with a short, irregular bole, larger well-formed trees have been observed.<sup>3</sup> The species has been utilized for fenceposts and fuelwood, and is a potential source of material for charcoal production. Its high value for wildlife food and cover makes it a desirable species to maintain in the forests.

Estimating potential charcoal recovery, and estimating strength characteristics of the wood for other uses, requires some knowledge of wood density and specific gravity. Thus, full increment cores were collected from a sample of Gambel oak on the Beaver Creek Watershed Evaluation Project in northern Arizona as a part of other research studies underway. These cores were used to establish a measure of specific gravity, and variation in specific gravity, at breast height.

Analytic procedures described by the U.S. Forest Products Laboratory<sup>4</sup> were used to determine the specific gravity of the cores. Specific gravity based on green volume and oven-dry weight, and wood density in pounds per cubic foot, were computed for each tree (table 1).

Well-prepared charcoal contains about one-third the weight and one-half the volume of the wood from which it is made.<sup>5</sup> If average solid wood content of 80 cubic feet per cord is assumed, charcoal recovery of approximately 1,000 pounds per cord could be expected. The charcoal would have a specific gravity of approximately 0.42, and a density of 26 pounds per cubic foot. If manufactured to acceptable quality standards, it would be suitable for marketing in either lump or briquet form.

<sup>1</sup>Technologist and Research Forester, respectively, located at Flagstaff, in cooperation with Arizona State College; central headquarters are maintained at Fort Collins, in cooperation with Colorado State University.

<sup>2</sup>Little, Elbert L., Jr. *Southwestern trees. A guide to the native species of New Mexico and Arizona.* U. S. Dept. Agr. Handb. 9, 109 pp., illus. 1950.

<sup>3</sup>One Gambel oak tree on the study area measured 36.9 inches in diameter, breast high, and 76 feet in height. The first fork in the stem was 24 feet above the ground.

<sup>4</sup>U. S. Forest Products Laboratory. *Methods of determining the specific gravity of wood.* U. S. Forest Serv., Forest Prod. Lab. Tech. Note B-14, 6 pp., illus. 1956.

<sup>5</sup>U. S. Forest Products Laboratory. *Charcoal production, marketing, and use.* U. S. Forest Serv., Forest Prod. Lab. Rpt. 2213, 137 pp., illus. 1961.

Table 1. --Specific gravity of Gambel oak at breast height by the increment core method

Size class	Trees	Specific gravity <sup>1</sup>				Density <sup>1</sup>	
		Maximum	Minimum	Mean	95 percent confidence interval	Mean	95 percent confidence interval
	<u>No.</u>					<u>Lbs. per cu. ft.</u>	
Saplings and small poles (2.0 - 6.9 inches)	15	0.706	0.596	0.653	±0.022	40.7	±1.37
Large poles (7.0 - 10.9 inches)	20	.693	.569	.624	± .015	38.9	± .94
Sawtimber (11.0 inches and over)	13	.696	.572	.625	± .024	39.0	±1.50
All classes	48	.706	.569	.634	± .010	39.6	± .62

<sup>1</sup> Based on oven-dry weight and green volume.

